GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Monthly Meeting of February; Meetings of March. A monthly meeting of the American Geographical Society was held on Tuesday evening, February 26, at the Engineering Society's Building, 29 West Thirty-ninth Street. President Greenough presided. He submitted for confirmation the names of 216 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society. Thereupon Dr. Henry Goddard Leach, Secretary of the American-Scandinavian Foundation, addressed the Society on "The Voyages of the Vikings." The lecture, which was illustrated, discussed the colonization of Iceland and Greenland by the old Norse voyagers and their discovery of America.

At an intermonthly meeting on March 12, at which President Greenough presided, Mr. Roy C. Andrews of the American Museum of Natural History addressed the Society on "Explorations in Western China." The lecture dealt with the zoölogical expedition undertaken under the auspices of the Museum in 1916-17 in the province of Yünnan. The explorations covered some little-traveled country in the western part of the province, the route making two loops from Talifu, one to the north and one to the south, and attaining the Mekong valley. Among the lantern slides in natural color (by the Paget process) illustrating the lecture were several remarkable views of this valley, one of the profound trenches characteristic of this region of intense folding, where the mountain systems of Central Asia in their deflection from an east-west to a southerly trend are constricted to a width of barely five hundred miles.

A monthly meeting was held on Tuesday evening, March 26. President Greenough presided. He submitted the names of 202 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society. Thereupon Mr. Edmund Heller, formerly of the Smithsonian Institution, addressed the Society on "The Geographical Barriers to the Distribution of Big Game Animals in Africa." The lecture dealt with the physical geography of eastern equatorial Africa in its relation to the ranges of big-game animals. The lecturer drew upon the experiences of his two expeditions to the region, the Smithsonian African Expedition under the direction of Colonel Roosevelt in 1909-10 and the Rainey African Expedition in 1911-12. The results of the former are laid down in a work, written jointly by Colonel Roosevelt and the lecturer, entitled "Life-Histories of African Game Animals" (2 vols., New York, 1914; accompanied by numerous zoögeographic maps), which was extensively reviewed in the *Bulletin of the American Geographical Society*, Vol. 47, 1915, pp. 190-192. Among effective barriers to animal distribution were mentioned such rivers as the Bahr el Djebel (upper Nile) and the Tana, because of the presence of crocodiles, and the Eastern Rift Valley, the structural depression containing Lakes Guaso Nyiro, Rudolf, and Stephanie.

NORTH AMERICA

A New Standard Rainfall Map of the United States. What will, for many years to come, be the standard map of mean annual precipitation for the United States has recently been published. It is an "advance sheet" (January, 1917) from the forthcoming "Atlas of American Agriculture" under preparation by the U. S. Department of Agriculture. It embodies the best and the latest information available. It recognizes the absolutely essential importance of using only records covering a uniform period, or reduced to a uniform period. In the location of the isohyetal lines it takes reasonable account of topography and of other conditions which indicate, or which control, the amount of precipitation. It is printed in eight shades of blue (under 10 inches; 10-15 inches; 15-20 inches; 20-30 inches; 30-40 inches; 40-50 inches; 50-60 inches; over 60 inches). The isohyetal lines are drawn for every 5 inches, on a base map on the scale of 1:8,000,000 showing the topography (by hachures) clearly and in ample detail, with the names of all the more important mountain ranges and individual mountains given. The new map is not only in itself interesting and pleasing cartographically, but it brings out many details of rainfall distribution which make its close study well worth while.

The records of about 1600 stations for the 20-year period 1895-1914 have been used, together with 2,000 additional records from 5 to 19 years in length. The latter series, it is most satisfactory to note, have been "uniformly adjusted to the same period," i. e.

they have been reduced to the same uniform period of 20 years. This reduction, which is inevitably a very laborious piece of work, the large number of stations employed, and the use of records through the year 1914, combined, make the new map by far the most accurate one available for the United States. Careful distinction is made, by symbols, between the different classes of stations. A small inset map, 1:34,000,000, shows the percentage of annual precipitation occurring between April 1 and September 30 (five shades of color) and was compiled from the records of about 1,600 stations, 1895-1914. An inset diagram shows the period of the year within which 50 per cent of the annual precipitation occurs in twelve districts.

The text which is to accompany the map has not yet been published. However, the principles which were followed in drawing the map are laid down in a recent paper by W. G. Reed and J. B. Kincer (The Preparation of Precipitation Charts, *Monthly Weather Rev.*, May, 1917, pp. 233-235). These had for their aim the uniform adjustment of the available records to the same period, on the one hand, and, on the other, a critical compromise between the method relying on existing rain-gage records alone and that employing reasonable generalization on the basis of known facts of topography, run-off, streamflow, and vegetation, where precipitation data are lacking. An interesting symposium of the various opinions on this subject was published in the *Monthly Weather Review* some fifteen years ago (Vol. 30, 1902, pp. 205-243).

The new map is made the basis for a general discussion of the rainfall of the United States by the undersigned (*Monthly Weather Rev.*, July, 1917, pp. 338-345; see also his "Rainfall Types of the United States," *Geogr. Rev.*, Vol. 4, 1917, pp. 131-144). A discussion of the essential facts of rainfall in the United States and their representation will be found in Mark Jefferson: Aridity and Humidity Maps of the United States, *Geogr. Rev.*, Vol. 1, 1916, pp. 203-208. R. DEC. WARD

A Non-Glacial Explanation of the Former Drainage of the Great Basin Area. Lately observation in the Great Basin calls into question the alleged dominant influence of a glacial climate in the production of the former large desert lakes, Bonneville and Lahontan. A simpler and more satisfactory explanation is found without recourse to climatic conditions so very different from those now existing in the region.

Ample evidence is forthcoming indicating that prior to the beginning of the Glacial Epoch two majestic rivers traversed this arid tract and flowed through to the sea. Part of the headwaters of the old river which occupied the long Bonneville basin are the headwaters of the present Snake River of Idaho. Professor W. W. Atwood has recently shown (The Physiographic Conditions at Butte, Montana, and Bingham Canyon, Utah, When the Copper Ores in These Districts Were Enriched, *Econ. Geol.*, Vol. 11, 1916, pp. 697-740) that just previous to the Glacial Epoch the basin of the Snake River extended nearly 200 miles farther to the northeastward than it now does. The continental divide then shifted 150 miles to the westward. An area nearly 300 miles square belonged to it that no longer does. This vast tract was mainly that part of the basin of the present Missouri River lying above the Great Falls. Passing Idaho Falls and Pocatello was a combined volume of waters of the present Snake River and of the Missouri River at the Great Falls gorge. This noble stream is thought to be the Old Virgen River, the superior companion of the Green River, that traversed the entire length of the Bonneville valley and fell into the Colorado River at the Big Bend in Arizona. By orographic damming of its course through the rapidly rising Colorado dome the waters of this old drainage way spread out far and wide over the illimitable desert plains. With the diversion of its headwaters the Old Virgen River could no longer furnish the chief supplies to Lake Bonneville, and the latter's waters evaporated until only a last vestige remained in the present expanse which we denominate Great Salt Lake.

In the recent migration of the continental divide in Montana the Yellowstone River took part of the Old Snake or Virgen headwater drainage, the Missouri River the great portion, the Clark Fork of the Columbia River a third share, and the Salmon Fork a part. Deprived of its headwaters and blocked by basalt flows at Pocatello, the remnantal preglacial stream was turned out over the Idaho lava fields as the diminutive riverlet that we find today as Snake River.

In a somewhat earlier effort (*U. S. Geol. Survey Prof. Paper No. 61*, 1909) Professor Atwood maps the areas once occupied by glaciers on the Wasatch and Uinta Mountains. The surprising result of this quantitative measurement is the utter insignificance of these mountain ice tongues. Neither as a direct cause, nor as an associated cause, of change in climate do they indicate that they were ever competent to effect noteworthy differences in the climatic conditions now existing.

So the former existence of great expanses of waters in the desert not only do not necessarily portend notably moister climate than that which prevails at the present day but it finds adequate explanation in the varied vicissitudes of normal river system

development. To this remarkable reversal of drainage and this still more remarkable shifting of the continental divide are ascribable all of those geographic changes which have made of Butte the greatest mining center of the world. CHARLES KEYES

Supplying the Canal Zone with Central and South American Products. The Panama Canal Commissary, in order not to draw upon food supplies of the United States for the support of the Canal Zone population, has established a considerable trade with nearby markets in Central and South America and in the West Indies (*Panama Canal Record,* Feb. 6, 1918, pp. 273-274). The provisions handled by the Zone authorities for the canal workers were formerly brought largely from this country, while the rich tropical lands of neighboring districts were drawn upon for little but the most perishable goods. Haiti and Costa Rica now supply most of the fresh fruit and vegetables. Coffee comes from these two countries and from Colombia. The latter also furnishes cattle, hogs, and poultry. Sugar is imported from Nicaragua and Colombia. Beans of several kinds are supplied by the west coast countries of South America, Haiti, and Costa Rica. Besides accomplishing its purpose of helping to relieve the food situation in North America, this plan will possibly lay the foundation for permanent trade relations with the districts near the isthmus and so foster the agricultural development of those regions, one of whose difficulties has always been the lack of convenient markets for their produce. Though the population of the Canal Zone will not be large, since most of the strip is being depopulated, yet, combined with the constantly increasing business of furnishing supplies for the steamers that use the canal, the trade should assist in making the Panama cities active commercial centers.

SOUTH AMERICA

South American Boundary Disputes, Settled and Unsettled. By treaty of July 15, 1916, Colombia and Ecuador came to agreement over their common frontier. The frontier thus defined terminates on the Pacific Coast along the Mataje River, south of the Mira, thus giving all the Mira delta to Colombia. East of the Andes Colombia is awarded the greater part of the basin of the Putumayo, the boundary running for the greater distance along the watershed between the rivers Putumayo and Napo. The eastern half of this region is, however, still in dispute with Peru. On the inset map accompanying Hermessen's article on the Rio Zamora (*Geogr. Rev.,* Vol. 4, 1917, p. 436) the new frontier is shown as far as its meeting with the line of the Peruvian-Ecuadorian frontier as shown on Pl. 212-213 of Andree's "Handatlas," 6th edition, Leipzig, 1914. Thence it runs along the Ambiyacú River to the Amazon. The text of the treaty is given in the *Revista de Geografía Colonial y Mercantil* (published by the Royal Geographical Society of Madrid), Vol. 14, 1917, No. 5-6, pp, 179-180.

The boundary between Ecuador and Peru constitutes one of the major South American frontiers still unsettled. Local interest in it has lately been revived through the railroad plans now under consideration by the governments of the respective countries. Peru is contemplating a line from Paita, her chief northern port, to the navigable waters of the Marañon, whereby the Amazonian port of Iquitos would be put into communication with the Pacific. Ecuador has three railroad projects which would materially aid her in making good her claims to the debated territory. One is completion of the Ambato-Curaray line, a line to the eastern lowlands; rails have been laid for 20 kilometers. A second is completion of the line from Puerto Bolivar, on the Gulf of Guayaquil near Machala, to the plateau town of Cuenca and thence extension to Loja near the present frontier. The third line contemplated, from Sibambe to Cuenca, would connect the proposed Loja line with the existing Guayaquil-Quito line (The Northern Frontiers: A Railway Struggle, with map, *West Coast Leader* (Lima, Peru), November 3, 1917; republished under the title of "A Long-standing Controversy," with new illustrations and map, in *The South American* (New York), January, 1918).

Of a more unique character is the dispute between Argentina and Uruguay (Argentina and Uruguay Boundary Dispute, *The South American,* January, 1918, from the *River Plate Observer*). When Uruguay was created by agreement between Argentina and Brazil in 1828 the southern boundary of the new republic was defined as the *coast* of the Rio de la Plata. Uruguay therefore has no legal control over the La Plata waters. In time of peace navigation on these waters is free to all nations, but Argentina reserves the right to close the river in case of war. Uruguay, seeking a more reassuring status, claims a right to one-half the river. Argentina objects in part on the grounds that the safeguarding of the great highway that leads into the heart of the continent cannot be entrusted to a small nation; in part because under the peculiar hydrography in question an adjudication according to international practice would prove unfavorable to her. The current of the La Plata swings towards the Uruguayan coast, where is to be found the

channel navigable for large craft. A division of the river in the middle would completely shut off Argentina from deep water. A division along the natural *talweg* would give the island of Martin Garcia, the military key to the upper rivers, to Urugnay.

EUROPE

The Geographical Basis of Alsace-Lorraine's Attachment to France. In a recently published work (La France de l'Est: Lorraine-Alsace, 280 pp., 2 maps, Colin, Paris, 1917) the dean of French geographers, Professor Vidal de la Blache of the Sorbonne, gives an admirable account of the geographical basis of the development of Alsace-Lorraine—the "France of the East." So, says the author, may be generically termed the region between the Rhine, the Meuse, and the Ardennes. What are the bases for it?

In history Alsace and Lorraine have repeatedly figured as frontier countries. It was inevitable, for they lie between peninsular Western Europe and Central Europe of the illimitable hinterland. Yet more than a frontier, this region—to consider the two countries together—anciently has figured as a connecting link, a passageway or rather as a place of crossroads. By the Alsatian Rhine the Danubian ways are linked with northern Germany. By the Moselle and the Toul Gap influences from the Paris Basin penetrate eastward. The Gap of Belfort and the Saône respectively connect Alsace and Lorraine with the Rhone and the Mediterranean. This very fact carries the suggestion that the region is not suitably built for political autonomy. Detailed examination of the structure confirms the conclusion. Holland, a small country, finds the basis of her political autonomy in the wide sea; Switzerland in her mountains. In Alsace-Lorraine is no physical feature making for such unity. Lorraine, geologically a dependence of the Paris Basin, with characteristic concentric zones here presenting great lithological variations in narrow space, is distinguished by marked "infirmity" of structure. Until the industrial penetration of the Vosges in recent times the sole link between Lorraine and Alsace was by the Col of Zabern: the countries turned their backs on one another. Even the Alsatian Plain between the two natural barriers of the Vosges and the Rhine—for the Rhine downstream to Strassburg has been a parter rather than a uniter of men—shows variations of soil and water conditions that have involved important modifications in human occupation. Where, then, belongs Alsace-Lorraine, torn between east and west? Certain arguments, ethnographic, linguistic, appropriate to the consideration of regions of less high development do not avail here. In human geography is found the justification of "France de l'Est," as unfolded in the region's development during the last two or three centuries, that is in modern times.

When the Peace of Westphalia (1648) gave France effectual sovereignty over these lands of her eastern border she found herself in control of a land-loving people of sturdy independence and real personality. Love of the soil was fundamental. In both Alsace with its naturally rich and varied resources and Lorraine with its more niggardly yet workable soil agriculture had reached a high degree of development. And love of the land was reinforced by democratic tendencies unusual for the time—themselves a heritage of the frontier. Here surely was need for delicate handling, and the need was recognized. France already showed signs of the assimilative power that was subsequently to make her great among colonizing nations. By slow degrees and natural channels only did the wise government of the Old Régime seek to bind the new territories. Language, religion, economic systems and privileges were respected. But one new element failed not to make an impression—French justice, "*justice égale.*" Thus, through a century and a half, was prepared the way for the event through which Alsace and Lorraine entered completely into French unity—the Revolution. And the Revolution that bound Alsace and Lorraine to France also emphasized their severance from Central Europe. When they saw the petty princelings and their feudal following take the road of Germany Alsace-Lorraine bade lasting farewell to spiritual domination from the region beyond the Rhine.

Nowhere did the Revolution find greater response than among the people of the East. It touched them in their most sensitive fiber, in their attachment to the soil. Its effects on the division of the land, the progress of agriculture, and the growth of the rural population are here seen at a maximum. Even during the wars of the Revolution and the Empire population exhibited no diminution, and with the establishment of peace in 1821 growth proceeded by leaps. Concomitant with it was a progress in industry which until the middle of the century was in close alliance with the agricultural advance. The divorce between agriculture and industry is first shown in the census figures for 1856. The ancient metallurgical industries of the Moselle, the long-established cotton industry of Mülhausen and the Vosgian valleys then began to enter on the modern industrial epoch. Highways of communication, canals and railroads, were built uniting Alsace and Lorraine

with each other and with the rest of France and with the Rhine. In the new economic adjustment of human relations, close organization and increased intercommunications, the two divisions for the first time in history formed a real unit.

This point needs emphasis: alone it makes clear the depth of injury wrought in 1871 by which the carefully built economic unity was destroyed. Yet the consequences were not entirely such as might have been anticipated. The remnant of eastern France left with but the crumbs of the metallurgical industries of Lorraine, with the weavers of the Vosges cut off from the Alsatian spinners, was not prostrated. Actually she gained by the misfortune of the lost provinces. A map of the gain and loss of population by canton in the frontier region since 1871 brings out a notable feature of this profit. The cantons of the western flank of the Vosges *en échelon* with Belfort have all gained in population, while those of the eastern flank have lost. Not individuals or families but whole groups of peoples removed themselves from Alsace and Lorraine to the departments immediately across the frontier, where, despite differences of dialect and customs, they found harmony of spirit. Probably it is no exaggeration to say that the exodus has accounted for 500,000 people, one-third of the population of 1866. Not for a quarter of a century, by aid of Prussian immigration and a mob of Italian and Polish laborers, was the deficit made up.

Perhaps the most remarkable feature of the mutilation was the impetus given to the iron-industry in French Lorraine. By discovery of the continuity of the ore deposits to the west, especially those of the Briey basin, and by admirable industrial organization France has here built up again an economic unit, curtailed though it may be by the political frontier across which mingle the smokes of the French and German foundries. And here appears a point of special interest. In this frontier region is mirrored the opposition of French and German aims; the French ideal of regional, and thus individual, development and the German ideal of hegemony. A comparison of population statistics for the cities of Metz and Nancy is instructive:

	1866	*1872*	*1881*	*1891*	*1901*	*1911*
Nancy	49,993	52,978	73,225	87,110	102,559	119,949
			1880	*1890*	*1900*	*1910*
Metz	54,817	51,332	53,171	60,186	58,462	68,598

It should further be borne in mind that a quarter of the population of Metz is military and official. In its geographical situation and its traditions Metz is eminently fitted to be a regional capital. Since 1871 the heavy hand of the German economist, subordinating Lorraine to the Westphalian coalfield, has stifled regional growth.

Strassburg alone of the large cities of Alsace-Lorraine shows a phenomenal growth since 1871, and this is dependent on the extraordinary development of the Rhine: it is another testimony to the ideal of German hegemony. The late improvement of the Rhine as a navigable waterway is the first stage in the development of a Central European route destined to be the master route of the continent. Enlightened nations have come to recognize the principle of free access for all to the great rivers and seas. German hegemony is subversive of this principle, which has so important a bearing on the great Rhine route. Before the war foreign flags already suffered serious handicap on the Rhine. By the restoration of France to the river the principle of free navigation would be safeguarded. Not only the complete development of France but also the harmony of world relations demand the re-establishment of France de l'Est.

ASIA

Japan's Growing Merchant Marine. According to the *Yokohama Chamber of Commerce Journal* for November, 1917 (p. 3), Japan will soon be building ships at the rate of 250 per year. This means an annual addition to her merchant marine of about 1,000,000 tons. Forty-two companies are engaged in the industry, with 113 slips already established and 24 more in course of construction. No figures are given as to the number of people employed, but an undertaking such as this must offer work for many thousands.

As an island people, with a dense population but a limited area for production, Japan, when she took her place among Western nations, recognized that hers would be the role of a maritime power. To maintain her economic independence she must have her own ships. Successful territorial or commercial expansion requires that maritime development keep pace with the acquisition of outlying possessions or foreign markets. The nation must keep in touch, too, with the many settlements which her over-populated islands send out into other lands.

Japan is favorably situated as a center of distribution in the Orient, but, otherwise,

her location far from the leading commercial countries, with the vast undeveloped Asiatic continent or the wide expanse of the Pacific interposed between her and the world's most active trade centers, means long journeys for her merchantmen and much time consumed in each voyage and, consequently, demands many ships for the traffic with Western nations.

A glance at the distribution of Japan's foreign trade reveals her need for a large merchant fleet. According to *Commerce Reports Supplement No. 55c* for December 31, 1917, the value of imports into Japan during 1916 was, in round numbers, $377,000,000 and that of exports was $562,000,000, giving a total foreign trade of nearly a billion dollars. (For the effect of the war on Japanese trade see the note in the January, 1918, *Review*, p. 77: Japan, the Commercial Focus of the Pacific.) A large part of this trade was with China, but much of it was carried on with countries far distant. For example, $40,000,000 worth of cotton and about $20,000,000 worth of iron manufactures had to be carried from the United States. Cotton valued at $4,000,000 was imported from Egypt. Dynamite worth nearly $1,000,000 came from Canada, England, and the United States. Peru, Sweden, Chile, France, and Italy figured also among the countries from which Japan imported. The distribution of exports, too, shows how far her merchants must fare in search of markets. Raw silk worth $112,000,000 was sent to the United States. The same material worth $16,000,000 went to France. The United Kingdom bought from Japan large shipments of peas, braids, copper ingots and slabs, husked rice, silk habutai, cotton underwear, etc. Japanese exports were in demand, also, in considerable quantities in Australia, British India, South Africa, Egypt, Italy, Denmark, Hawaii, Argentina, Norway, and Chile. Furthermore, Japan is becoming an important center of redistribution. Sugar from the Philippines and the Dutch East Indies was reshipped to China. Cotton from India, the United States, China, and Egypt was manufactured and exported to China, Australia, the Philippines, Cape Colony, Asiatic Russia, the United Kingdom, and many other countries. Clothing made from Australian wool was reshipped to China, India, France, England, and Russia.

The present employment of many ships for transporting troops, considerable losses to Allied tonnage, and the continued absence of German shipping from the seas offer Japan an unparalleled opportunity to build up a great merchant marine that will soon make her, in maritime commerce at least, the England of the Pacific.

MATHEMATICAL GEOGRAPHY

British Versus Metric Measures in Geographical Work. Is it desirable for the British Empire to adopt the metric system of weights and measures? To this question at the time under the consideration of the conjoint Board of Scientific Societies a geographical contribution was made by Arthur R. Hinks in a paper read before the Royal Geographical Society (British and Metric Measures in Geographical Work: Notes for Discussion, *Geogr. Journ.*, March, 1917). Naturally the geographer is most concerned with lineal measurements, in regard of which Mr. Hinks makes propositions summarized thus:

"All British maps should be provided with scales of horizontal distances both in miles and kilometers; heights and contours should as far as possible be in meters, both on land and in the sea. The representative fractions of all British maps should as far as possible be in round numbers.

"In work relating to countries which use the metric system and in statistics, results should be given in British and metric, or in metric alone, but not in British alone. The more technical the work, the more desirable is the use of the metric units. In British geodesy the metric system exclusively should be used for the future."

Emphasis is laid upon the need of a single standard for purposes of geodesy, where the greatest precision is demanded in regional comparisons, and for the construction of contoured maps, where transformation to the British unit cannot be made with exactitude, a fact clearly brought out in the work that has been done on the 1:1,000,000 map of Europe and the Near East which, compiled under the direction of the British General Staff, is being published by the Royal Geographical Society (see *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 776-777.

A New Chart for the Barometric Determination of Altitudes. The difficulties in connection with the accurate determination of altitudes by means of barometers are well known. There are the questions of transporting mercurial barometers; the errors of aneroids; the need of simultaneous observations of temperature and pressure at the upper elevation and at a lower station whose altitude is known; the effects of temperature, water vapor, latitude, etc. The allowance which must be made for varying temperatures is the most important.

In order to facilitate a quick and accurate determination of altitude, the pressure and the temperature being known, Professor Alexander McAdie of Blue Hill Observatory near Boston, Mass., has designed a neat and convenient chart. This is primarily intended for the use of aviators. It permits the rapid estimation of the altitude, taking account of necessary correction for the mean temperature of the air column. The chart is about 13½ by 8 inches in size. Four different temperature scales are given (at the left of the card), Fahrenheit, Centigrade, Absolute, and New (see *Geogr. Rev.*, Vol. 4, 1917, p. 215, Fig. 1). The range is from +90° to —22° Fahrenheit. Across the top of the sheet are the pressure scales (inches, millimeters, and kilobars), ranging from 30.00 inches at the left to 21.20 inches at the right. At the bottom are two altitude scales, in feet and meters. The range is from sea-level to 9,000 feet. The method of using this card is as follows: A rubber band is placed around the cardboard from left to right and is adjusted to the observed temperature. A second rubber band is placed around the cardboard from top to bottom in such a way that it runs from the observed pressure reading parallel to the nearest of several slanting broken lines. From the point of intersection of the two rubber bands, the vertical co-ordinate is followed to the bottom of the diagram, where the altitude, corrected for temperature, is read off. On the reverse of the chart there is a brief statement concerning the barometric determination of altitudes and an explanation of the use of the chart. R. DEC. WARD

PHYSICAL GEOGRAPHY

The Work of the Wind in Warming a Lake. The work of the wind is largely responsible for the annual warming of lakes below a depth of two or three meters, beyond which sunlight does not penetrate appreciably. Professor E. A. Birge has made a careful study of the amount of work required to give the observed temperatures of the different layers (*Trans. Wisconsin Acad. of Sci., Arts, and Letters*, Vol. 18, Pt. 2, August, 1916, pp. 341-391). The sun and wind effects are constantly in a conflict in which the former is uppermost in summer, but the latter in autumn. The more the sun warms the surface layers of a lake, the more difficult it is for the wind to produce currents of warm water downward against gravity. This is particularly the case for shallow or small lakes. For example, compare Lake Geneva with Green Lake, both in Wisconsin. They have about the same surface area and about the same summer heat income, 27,000 calories per square centimeter in 1913; but Lake Geneva at a depth of 20 meters has an area only 51 per cent of the surface while Green Lake has a corresponding 61 per cent. The 3,690 calories per square centimeter distributed in Lake Geneva below 20 meters required a minimum of 500.6 gram-centimeters of work, whereas Green Lake had 5,450 calories distributed at a cost of at least 476.5 gram-centimeters. This difference is due to the greater warming of the upper layers of the shallow lake, which makes the thermocline (at 7 to 11 meters) steeper, and so more resistant to down-currents, than that in a deep lake. The stronger the wind, the greater the resistance to a downward current becomes, for, as the warm water is piled up on the leeward side of the lake, it is forced down closer to the cold water. Professor Birge has likened the work of the wind on a lake to pressure on a spring: the more it is compressed, the harder it has to be pushed; and when the pressure is released there may be little or no permanent result. CHARLES F. BROOKS

Showers of Organic Matter. There are many cases on record of the occurrence of showers of organic and inorganic matter. Ancient as well as modern chronicles mention falls of insects, of small animals such as toads, of dust, of seeds, of fish. "Blood rain" has always caused superstitious fear among ignorant people. The whole subject is an interesting one, especially from a meteorological standpoint. The biologist also has a real interest in it because of the possibility of the transportation, in such "showers," of animal or plant life. A discussion of showers of organic matter by Waldo L. McAtee of the U. S. Bureau of Biological Survey brings together a large number of facts and is of more than usual popular interest (*Monthly Weather Rev.*, May, 1917, pp. 217-224). The author deals first with "spurious showers." In this group are included "manna rains." Manna consists of lichens of the genus *Lecanora*. In none of the recorded cases of such "rains" is there any direct evidence that the substance fell from the sky. These lichens, forming small round bodies, are easily blown over the earth's surface, accumulate readily in depressions, and are drifted into masses during the run-off of rain water. Manna "rains" occur only in regions where these lichens are common. "True showers" include red rains (dust) and showers of plants, invertebrates and vertebrates. The most interesting "showers" are those of frogs or toads and of fish. The author gives several historic examples of such occurrences and states that "there cannot be the slightest doubt that there are genuine phenomena of this character, though perhaps

not so numerous as the recorded instances.'' In regard to showers of fish, it is well known that waterspouts have been observed to empty fish ponds and scatter their occupants.

The author concludes that the spectacular showers of organic matter have little importance in the distribution of life. The animals are usually dead or soon die because they fall in an unfavorable environment. On the other hand, the distribution, by atmospheric movements, of minute eggs and spores is of great significance. Such bodies are adapted to survive transportation, and, being in large numbers and widely scattered, there is a good chance that some of them will survive. R. DEC. WARD

HUMAN GEOGRAPHY

Meteorology and Flying. It is inevitable that, with the remarkable increase in the number of aeronauts and aviators resulting from the war, more and more attention should be paid to the importance of meteorology in connection with flying. At critical times meteorological knowledge has time and again proved its practical value to those who navigate the air. And the men who fly will, in their turn, advance meteorological science by means of the facts which their own practical experience in the air will impress upon their minds. He who knows most about practical meteorology is the best equipped for service in the air. He is, therefore, the most likely, other things being equal, to do his country the greatest service.

Journals devoted to aeronautics and aviation, meteorological journals, and publications dealing with general science, have all published, within the last three years especially, numerous articles on meteorological subjects of interest to flyers. Two recent publications along this line are of special importance because they cover a rather wider field than do most of the earlier discussions and because they contain much of immediate practical use. The National Advisory Committee for Aeronautics has published (*Report No. 13*, 1917) a report on ''Meteorology and Aeronautics,'' prepared by Professor W. R. Blair, a member of the Subcommittee on Relation of the Atmosphere to Aeronautics, in charge of the aerological investigations of the U. S. Weather Bureau. Professor Blair is now a Major in the Signal Corps, U. S. R. The purpose of the report ''is to show the sort of atmospheric data available and to put the subject in such shape as may make it bear directly on the problems which are met in aviation.'' There are three parts. The first concerns the physical properties and dynamics of the atmosphere. The second is devoted to topographic and climatic factors in relation to aeronautics. The third deals with current meteorology and its use. Copies of this pamphlet may be secured from the National Advisory Committee for Aeronautics, Washington, D. C.

Another paper, by Professor R. DeC. Ward of Harvard University, entitled ''Meteorology and War-Flying,'' appears in the *Monthly Weather Review* for December, 1917. This embodies, in highly condensed form, the substance of the lectures which the author has been giving at the U. S. Army School of Military Aeronautics at the Massachusetts Institute of Technology. The matter is presented in as simple and practical a way as possible. Details are omitted. The essential facts which the aviator needs to know are alone emphasized.

Meteorology has much to offer to those who fly, but, as Major Blair says in the introduction to his report, ''just what information will be most useful to the aviator is a question that experience and possible development of aircraft must determine.''

Increasing Commerce in Vegetable Oils. An article in the January, 1918, number of *The Americas* (pp. 22-27; published by the National City Bank of New York) calls attention to the world-wide search for oils.

Vegetable oils have become a very important item of commerce within the past decade. They are used for industrial purposes and, especially since the supply of animal fats has been so limited, for foodstuffs as well. Besides olives the principal sources of supply are cottonseed, coconut, the soya bean, cacao, peanuts, flaxseed, and the castor bean. Corn kernels, rape seed, and palm kernels also yield an increasingly important amount of oil. From most of these materials butter and salad oils are made which have largely taken the place of animal products in European countries and to a lesser extent in the United States. Holland now exports twice as much margarine as dairy butter. Consul T. D. Edwards, at Cornwall, Ont., reports that the manufacture of margarine is a promising industry in Canada (*Commerce Repts.*, Jan. 15, 1918).

The countries about the Mediterranean hold first place in the production of olive oil. Present demands have stimulated their output. The French olive crop for 1917 was estimated to be the largest in twenty years, sufficient to yield 8,000,000 gallons of edible oil and 65,000 metric tons of oil cake (*Commerce Repts.*, Dec. 22, 1917). The United States produces the greatest amount of cottonseed oil, but China, India, and Egypt provide

large quantities. Mexican ginning mills are now planning to utilize cottonseed for oil (*ibid.*, Jan. 10, 1918). The dried meat of the coconut, called copra in commerce, is used for the manufacture of coconut oil. The palm from which this is taken grows in India, the Straits Settlements, the Philippines, and other Pacific islands. Some of these island groups have received their first close contact with modern civilization through the recently established coconut plantations. The soya bean, a product of Manchuria, is exported in large quantities by Japanese concerns. The United States employs nearly 200,000 tons per year of the oil from this bean. The better grades are used in margarine, the poorer grades for industrial purposes, while the residue, made into large round cakes, serves as cattle feed or fertilizer. Peanut oil, shipped from China, Japan, West Africa, and India, is becoming more and more a staple oil for food. Our own Southern States produce large quantities of peanuts. Only recently, however, has the extraction of oil become an important industry there. Argentina, India, and Canada raise most of the flaxseed used in manufacturing paints, varnishes, linoleum, and soap. This oil seldom enters into food products. Since England conquered German East Africa its groves of wild oil-palms have materially added to her available sources of palm oil. She already held the greater part of the world's supply in her West African possessions. The castor bean, a native of Africa, now grows wild in many tropical lands. India produces more than any other country. Italy and California also make quantities of castor oil. As India's supply now goes solely to England, the United States has begun to import from Brazil, where, in the region of Pernambuco, the plant is found but has not been largely exploited.

Before the war most of the vegetable oils were extracted in crushing mills located far from the regions where the plants were grown, chiefly at Marseilles, at Harburg (near Hamburg), at Hull in England, and in several places in the United States. In the last few years, however, many local mills have been established near centers of production, and the oil itself has thus become the article of commerce.

GEOGRAPHICAL NEWS

Proposed Departure This Year of Amundsen's Polar Drift Expedition. Captain Roald Amundsen arrived in this country on March 16 for a stay of two or three weeks to purchase supplies for his proposed Polar drift. It will be recalled that he had originally planned it for 1910 (*Bull. Amer. Geogr. Soc.*, Vol. 40, 1908, p. 751, and Vol. 41, 1909, p. 702), but he later changed his plan and started in that year for the Antarctic on the expedition on which he reached the South Pole (*ibid.*, Vol. 43, 1911, p. 451). He then scheduled it for 1914 (*ibid.*, Vol. 45, 1913, p. 618), and the *Fram*, Nansen's old vessel, which had been refitted for the expedition, set sail in that year for Bering Strait via the Panama Canal. But slides interfered with the opening of the canal at the appointed time, and the consequent delay made it necessary to abandon the expedition for that year and postpone it to the next (*ibid.*, Vol. 46, 1914, pp. 532-533). But even this plan was made impossible by the changed conditions due to the beginning of the war. The expedition was then definitely arranged for 1918, and Captain Amundsen made a previous visit to this country in the winter of 1916-17 to secure supplies (*Geogr. Rev.*, Vol. 2, 1916, pp. 473-474).

As at present outlined Captain Amundsen's plan is to leave Norway in June or July and proceed east along the Siberian coast if possible as far as the De Long Islands (158° E.), otherwise as far as the New Siberian Islands (140° E.), and enter the pack there for the drift across the Polar basin to the point of emergence between Greenland and Spitzbergen. The earlier plan contemplated entering the Polar Basin through Bering Strait. The expedition will be equipped for seven years, although it is expected to last only four or five years. It will leave on a new vessel, the *Maude*, especially constructed by Amundsen himself with an egg-shaped hull to withstand ice-pressure. The *Maude* is a fore-and-aft schooner, equipped with 140-horsepower engines burning crude oil, giving a speed of 8 or 9 knots. She is of 900 tons register, 120 feet in length, 40 feet beam, and draws 12 feet of water (*New York Herald*, March 3, 1918; and *New York Times*, March 17, 1918).

PERSONAL

DR. H. M. AMI of the Geological Survey of Canada read a paper entitled "Notes on the Geology of Asia Minor" before the Geological Society of Washington on May 9, 1917. The general geological features were outlined with special reference to large undeveloped mineral resources.

PROFESSOR W. M. DAVIS gave an illustrated lecture before the Appalachian Mountain Club in Boston on March 27 entitled "The Geography of Northern France in Relation to the World War."

PROFESSOR LOUIS GENTIL of the University of Paris was awarded the Prix Delesse by the Paris Academy of Sciences on December 10, 1917, for his work on the geology and physical geography of northern Africa, particularly Morocco. Professor Gentil's work is summarized in his admirable "Le Maroc physique" (Paris, 1912).

M. HENRI JUMELLE, professor of botany at the University of Marseilles and Director of the Colonial Museum of that city, was awarded the Prix Gay of the Paris Academy of Sciences on December 10, 1917, for his work on the geographical distribution of tropical and sub-tropical plants of economic value.

On DR. J. SCOTT KELTIE, editor of the "Statesman's Year-Book" and for many years Secretary of the Royal Geographical Society of London, was conferred the honor of knighthood on the occasion of the annual distribution of New Year honors in Great Britain.

MR. W. T. LEE of the U. S. Geological Survey read a paper before the Geological Society of Washington on May 9, 1917, entitled "The Geology and Scenery of the Rocky Mountain National Park."

DR. H. H. RUSBY of New York read a paper before the Torrey Botanical Club on February 12 entitled "Botanical Exploration in Colombia."

M. FRANÇOIS SCHRADER, the geographer and cartographer, head of the map department of the publishing firm of Hachette et Cie. of Paris, has been giving a course on "The Geographic Causes of Affinity and Differentiation Among Human Groups; Evolution of the Old World" during the past winter at the Ecole d'Anthropologie de Paris.

DR. AUREL STEIN received an award from the Fondation Tchihatchef at the hands of the Paris Academy of Sciences on December 10, 1917, for the work of his three Central Asian expeditions (1900-01, 1906-08, 1913-16).

DR. STEPHEN S. VISHER of the Department of Geography of the State Normal School at Moorhead, Minnesota, has been appointed a land classifier in the U. S. Geological Survey. The Survey's Land-Classification Board is engaged on the classification of more than 20,000,000 acres of arid land situated in the western part of the United States.

OBITUARY

DR. ROLLIN A. HARRIS, tidal expert of the U. S. Coast and Geodetic Survey, died suddenly on January 20 at the age of 55. His major work is a "Manual of Tides," a monumental treatment of the subject which appeared as Appendices to the *Annual Reports of the U. S. Coast and Geodetic Survey*, as follows: Part I, Introduction and Historical Treatment of the Subject, 150 pp., App. 8, *Rept. for 1897;* Part II, Tidal Observation, Equilibrium Theory, and Harmonic Analysis, 147 pp., App. 9, *Rept. for 1897;* Part III, Some Connections between Harmonic and Nonharmonic Quantities, Including Applications to the Reduction and Prediction of Tides, 137 pp., App. 7, *Rept. for 1894;* Part IVa, Outlines of Tidal Theory, 165 pp., App. 7, *Rept. for 1900*; Part IV B, Cotidal Lines for the World, 85 pp., App. 5, *Rept. for 1904;* Part V, Currents, Shallow-water Tides, Meteorological Tides, and Miscellaneous Matters, 315 pp., App. 6, *Rept. for 1907*. For an estimate of Harris' tidal theory as developed in this manual see Krümmel's "Handbuch der Ozeanographie," 2nd edit., Vol. 2, pp. 254-258, 1911, and Poincaré's "Mécanique Céleste." To geographers Dr. Harris was possibly best known for his advocacy, on the basis of tidal observations, of the existence of a land mass northwest of the American Arctic Archipelago ("Arctic Tides," 103 pp., U. S. Coast and Geodetic Survey, Washington, 1916). Nansen has recently taken exception to the arguments on which this view was based ("Spitsbergen Waters," Art. 2 in *Kristiania Videnskapsselskapets Skrifter: Mat. Naturv. Klasse, 1915;* see especially section on "The Extension and Shape of the North Polar Basin," pp. 92-98); and the recent advances into the unknown made by the MacMillan and Stefansson expeditions (see the March *Review*, pp. 238-241, with map), the plan of the latter of which was partly based on Harris' theory, would seem to show that at any rate no land exists as near to the known coasts as assumed by him.